

REMARKS

This paper is filed in response to the Office Action mailed on June 2, 2004.

In the Office Action, claims 1-7 stand rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,165,871 ("Lim") in view of U.S. Patent No. 6,355,540 ("Wu") or Lim, Wu in further in view of U.S. Patent No. 4,866,004 ("Fukushima"). In response, claim 1 has been amended to traverse these rejections.

Specifically, claim 1, as presently amended, clearly recites the formation of a first insulation film at the bottom portion of the V-type trench by means of an oxidation process while leaving the insulation spacers on the sidewalls substantially exposed followed by a subsequent filling of the aperture with the second insulation film. Claim 1 also requires the formation of insulation film spacers on the sidewall of the pad nitride film and pad oxide film that defines the aperture of the trench while leaving the bottom V-shaped portion of the trench substantially exposed. Applicants respectfully submit that no combination of the cited prior art references teaches or suggests these process steps in combination with a V-shaped trench.

In order for an obviousness rejection to be proper, under MPEP §§ 2142 and 2143,

[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Citing, In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); *see also* MPEP § 2143-§ 2143.03 for decisions pertinent to each of these criteria.

Applicants respectfully submit that no combination of Lim, Wu and Fukushima teaches or suggests all of the limitations of amended claim 1 and there is no suggestion or motivation to substantially modify the Lim reference with Wu and/or

Fukushima to arrive at the process recited in amended claim 1. Accordingly, Applicants respectfully submit that the obviousness rejections are improper and should be withdrawn.

Specifically, the base reference, Lim, is deficient in a number of respects. At the outset, it does not teach or suggest the formation of a V-shaped trench. Further, Lim does not teach or suggest the formation of a first insulation layer at the bottom V-shaped portion of the trench leaving the sidewall insulation spacers substantially exposed as recited by amended claim 1. Lim also does not teach or suggest the subsequent filing of the aperture or trench with a second insulation layer. Finally, Lim does not teach or suggest the formation of sidewall insulation spacers that leave the bottom V-shaped portion of the trench exposed and intact. Instead, Lim teaches an etching process which further etches the trench as shown in Fig. 8 of Lim. Thus, Lim is clearly deficient as a base reference and, for the reasons set forth below, no combination of Wu and Fukushima can supplement the deficiencies of Lim.

Wu, like Lim, fails to teach or suggest a V-shaped trench. Further, Wu teaches away from the solution provided by amended claim 1 by teaching the formation of an isolation layer 14 that covers the entire trench. Thus, Wu does not teach or suggest the formation of insulation spacers on sidewalls of the trench and, in fact, teaches away from this process step. While Lim teaches the formation of nitride spacers 50, it does not teach the formation of these spacers while maintaining intact the structure of a V-shaped bottom portion of the trench. Instead, Lim teaches the substantial etching of the bottom of the trench during its spacer formation as shown in Fig. 8. Thus, Wu does not teach or suggest the formation of any spacers and Lim teaches away from the formation of the spacers recited by claim 1 by teaching the use of the anisotropic etching process which further etches the trench 52 as shown in Fig. 8 of Lim.

Further, Wu obviously does not teach or suggest the formation of two isolation layers as recited by claim 1 as Wu does not teach or suggest the formation of any isolation layer. Instead, Wu teaches the formation of a dielectric film 16 which fills the trench. Thus, both Wu and Lim teach away from the use of a two-step process where a first and second insulating films are formed in a V-shaped trench.

Accordingly, there can be no *prima facie* case of obviousness based upon any combination of Wu and Lim as set forth in the Office Action. Further, Wu cannot

supplement Lim in terms of Lim's deficiencies in connection with its spacer 50 formation because Wu does not teach or suggest any spacer formation at all.

In view of these vast deficiencies, Applicants respectfully submit that amended claim 1 is clearly allowable over any hypothetical combination of Lim and Wu. The Patent Office does cite Fukushima as a tertiary reference. However, Fukushima only teaches the formation of a V-shaped bottom portion of a trench and Fukushima cannot supplement Lim and Wu in connection with their failure to teach or suggest the two-part process of forming the insulation film, the spacer formation on the sidewalls without further etching the trench or the formation of a first insulation film in the V-shaped bottom portion of the trench while leaving the spacers exposed. No combination of Lim, Wu and Fukushima teach or suggest these features of amended claim 1.

Accordingly, Applicants respectfully submit the obviousness rejections are improper and should be withdrawn.

An early action indicating the allowability of this application is respectfully requested. A petition for a 3-month extension of time is submitted herewith. If any additional fees are due, the Patent Office is authorized to deduct said fees from Deposit Account No. 13-2855.

Further, if the Examiner has any further questions or comments regarding this application, he is invited to telephone the undersigned at the number listed below.

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Respectfully submitted,

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